

### **REMARKS**

Claims 1-3, 5-12 and 14-22 are the claims pending in the application. Claims 1-3, 5-12 and 14-22 stand rejected on prior art grounds. Applicants respectfully traverse the prior art rejections based on the following discussion.

#### **I. The Prior Art Rejections**

Claims 1-3, 5-12, 14-20 and 22 are rejected under 35 U.S.C. 103(a) as obvious over Guire, et al. ("Guire")(U.S. Patent Application 2003/0077452) in view of Van Alsten ("Van Alsten")(U.S. Patent 6,299,983). Claim 21 is rejected under 35 U.S.C. 103(a) as obvious over Guire in view of Van Alsten, and further in view of Bradshaw ("Bradshaw")(U.S. Patent 5,594,064).

##### **A. The Rejection Based on Guire in view of Van Alsten**

Regarding independent claim 1, and related dependent claims 2, 3, 5-12 and 14-20 and 22, the references, separately, or in combination, fail to disclose, teach or suggest a reason or motivation for being combined.

As previously discussed in the Amendment of December 14, 2007, nothing within Guire, which relates to a self-assembling monolayer on a surface of medical devices to provide the surface with desirable ultra-thin coating properties for interaction with bodily fluid, suggests using a derivatized metal surface, including an aliphatic acid backbone, of functionalized polymers with improved durability as disclosed in Van Alsten.

Please note, it is questionable whether Guire could substitute in Van Alsten's materials, which include zinc, as part of a material used inside a body as Guire

specifically indicates problems of materials interacting with bodily fluids. Thus, this combination of references probably is not meant to be combined with each other in a real environment. Applicant would be willing to provide a statement from the medical community regarding this combination and the impact on a human.

Therefore, and using the most recent and more relaxed interpretation of obviousness under KSR v. Teleflex, No. 04-1350, 550 U.S. \_\_ (April 30, 2007), one of ordinary skill in the art of would not have combined these references absent hindsight.

Second, even assuming that the references would have been combined, Van Alsten does not disclose, teach or suggest the features of independent claim 1, including the first and second linking functional groups are chemically bonded to respective surfaces of a corresponding pair of the inorganic particles so that the multifunctional linking molecules interconnect at least three of the inorganic particles to one another to form a network of the inorganic particles interconnected by the multifunctional linking molecules, which are intermediate the inorganic particles. (See Application, Page 7, lines 8-15; Page 8, lines 8-23; Page 9, lines 8-18; Page 11, lines 1-12; Page 15, lines 1-15; and Figures 1 and 2).

Indeed, Applicant agrees with the Office Action that Guire does not disclose, teach or suggest, the use of multifunctional linking groups or fluorine atoms appended to the backbone. Accordingly, Applicant traverses the assertion that Guire teaches the rest of the limitations of the claims, including the above cited feature of claim 1. (See Office Action, Page 3, Second Paragraph).

Van Alsten is also deficient.

As previously discussed in the Amendment of December 14, 2007, Figures 1-4 of Van Alsten merely disclose a conventional process for producing a derivatized metal surface, including an aliphatic acid backbone, of functionalized polymers with improved durability. In particular, the process for producing a derivatized metal surface includes contacting a metal surface with an  $\alpha$ - $\omega$  difunctional substantially linear aliphatic or fluoroaliphatic acid, or salt thereof, represented by the formula,  $\alpha$ -R- $\omega$  (what the Examiner appears to analogize to Applicant's multifunctional linking molecule(s)). The R is an  $\alpha$ - $\omega$  bidentate substantially unbranched aliphatic or fluoroaliphatic organic radical with a first end and a second end. The  $\alpha$  is a functional group selected from radicals of oxyacids of different elements, for example, phosphorous. The  $\omega$  is a functional group selected, independently, of the  $\alpha$ , from the group consisting of radiocals of oxyacids of different elements, for example, phosphorous. Importantly, the  $\alpha$  end of the  $\alpha$ - $\omega$  species forms an anion group ioncially bound to cations formed from the metal surface, while the  $\omega$  end exhibits the receptivity to association with certain other functional molecules other than a metal surface. To be sure, the first end is bonded to an anion of an oxy-acid where the anion is ionically bonded to the metal cations on the surface of the substrate while the second end is bonded to a functional group. Accordingly, the  $\omega$  end is bonded to a molecule, such as, metal salt, not a metal surface like the  $\alpha$  end. Therefore, only one end, that is, the  $\alpha$  end, of the  $\alpha$ - $\omega$  species is bonded to a metal surface unlike Applicant's claimed invention where the multifunctional linking molecules are bonded to surfaces of particles, and thus are intermediate the inorganic particles. Van Alsten also does not disclose, teach or suggest multifunctional linking molecules, let alone, the first and second linking functional groups are chemically bonded to respective surfaces of a

corresponding pair of the inorganic particles so that the multifunctional linking molecules interconnect at least three of the inorganic particles to one another to form a network of the inorganic particles interconnected by the multifunctional linking molecules, which are intermediate the inorganic particles. Consequently, Van Alsten is specifically designed for producing a derivatized metal surface of functionalized polymers with improved durability not producing multifunctional linking molecules for interconnecting inorganic particles, for example, metal, to form a network of inorganic particles like Applicant's invention. Thus, Van Alsten is structurally distinct from Applicant's claimed invention. Van Alsten is also a deficient reference.

In contrast, and for emphasis, Applicant discloses an energetic composite material including inorganic particles, and self assembled monolayers formed on the inorganic particles. In particular, a multi-functional linking molecule 14 and optional non-linking molecules 16 align to establish a self-assembled monolayer 18 ("SAM") on the inorganic particles 10. The multi-functional linking molecule(s) 14 are intermediate the inorganic particles and interconnect the inorganic particles 10 to form a network of interconnected inorganic particles 10. The multifunctional linking molecule 14 includes a hydrocarbon backbone 14a, a first terminal carboxyl functional group 14b and a second terminal carboxyl functional group 14c. Importantly, the first terminal carboxyl functional group 14b is bonded to a surface 12a of inorganic particle 10a, and similarly, the second terminal carboxyl functional group 14c is bonded to a surface 12b of an inorganic particle 10b. In an exemplary embodiment, the inorganic particles 10a, 10b are metallic substrates with metal surfaces 12a, 12b, respectively. Based on this configuration, as

indicated above, the multi-functional linking molecule 14 interconnect the inorganic particles 10a, 10b together. (See Application above).

For emphasis, Applicant discloses a multi-functional linking molecule(s) 14 bonding to surfaces 12a, 12b of at least three inorganic particles, 10a, 10b, for example, metal substrates, to form a network of interconnected inorganic particles 10a, 10b, whereas Van Alsten only discloses an  $\alpha$ - $\omega$  species of an aliphatic acid where the  $\alpha$  end is bonded to a surface, such as, a metal surface, while the  $\omega$  end is associated with certain functional molecules other than a metal surface, without any multi-functional linking molecule, let alone, a multi-functional linking molecule bonded to respective surfaces of inorganic particles, for example, metal substrates. Thus, Applicant traverses the assertion that Van Alsten teaches Applicant's claimed invention.

For at least the reasons outlined above, and using the most recent and more relaxed interpretation of obviousness under KSR v. Teleflex, No. 04-1350, 550 U.S. \_\_ (April 30, 2007), Applicant respectfully submits that neither Guire nor Van Alsten, alone or in combination, disclose, teach or suggest including, the first and second linking functional groups are chemically bonded to respective surfaces of a corresponding pair of the inorganic particles so that the multifunctional linking molecules interconnect at least three of the inorganic particles to one another to form a network of the inorganic particles interconnected by the multifunctional linking molecules, which are intermediate the inorganic particles as recited in independent claim 1 of Applicant's invention.

For the reasons stated above, the claimed invention, and the invention as cited in independent claims 1, and related dependent claims 2, 3, 5-12, 14-20 and 22, are fully patentable over the cited references.

#### B. The Bradshaw Reference

To make up for the deficiencies of Guire and Van Alsten as discussed above, the Examiner relies on Bradshaw. Bradshaw fails to do so.

First, Bradshaw does not have the same aim as either Guire or Van Alsten as discussed above.

As previously discussed in the Amendment of December 14, 2007, and using the most recent and more relaxed interpretation of obviousness under KSR v. Teleflex, No. 04-1350, 550 U.S. \_\_\_\_ (April 30, 2007), Bradshaw does not disclose, teach or suggest, the first and second linking functional groups are chemically bonded to respective surfaces of a corresponding pair of the inorganic particles so that the multifunctional linking molecules interconnect at least three of the inorganic particles to one another to form a network of the inorganic particles interconnected by the multifunctional linking molecules, which are intermediate the inorganic particles, as recited in independent claim 1 of Applicant's invention.

Again, Bradshaw does not disclose, teach or suggest, including a member selected from the group consisting of the multifunctional linking molecules and the non-linking molecules comprises an ethylenically unsaturated crosslinkable group as recited in claim 21.

Instead, Bradshaw recites a polymeric composition containing inorganic fillers and a binder component where the binder component encapsulates the filler without any multi-functional linking molecule. Since Bradshaw does not include a multi-functional linking molecule, let alone, the first and second linking functional groups are chemically bonded to respective surfaces of a corresponding pair of the inorganic particles so that the multifunctional linking molecules interconnect at least three of the inorganic particles to one another to form a network of the inorganic particles interconnected by the multifunctional linking molecules, which are intermediate the inorganic particles, Bradshaw is deficient. Thus, Bradshaw does not teach the specific limitation of claim 21. (See Bradshaw at Abstract; Column 1, lines 10-20; Column 1, line 60-Column 2, line 6; Column 3, lines 3-25; and Figures 1-5).

## II. Formal Matters and Conclusions

In view of the foregoing, Applicants submit that claims 1-3, 5-12, and 14-22, all the claims presently pending in the application, are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary.

Please charge any deficiencies and credit any overpayment to Attorney's Deposit

Account Number 50-1114.

Respectfully submitted,

Dated: 17 October 2008

A handwritten signature in cursive script, reading "Fredric J. Zimmerman", written over a horizontal line.

Fredric J. Zimmerman  
Registration No. 48, 747

Department of the Navy  
Office of Counsel  
3824 Strauss Ave., Suite 103  
Indian Head, MD 20640-5152  
(301) 744-5603